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No. 17

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WEST EUROPE REPORT

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CONTENTS

CONTENTS (Continued) Page

AVIONICS FIRM SUCCEEDS IN NATIONAL, FOREIGN MARKETS

Gelsenkirchen AEROKURIER in German Jan 80 pp 36-38

[Article by GK: "Avionics 'Made in Germany': Becker Avionics Successful Internationally; New Plant in Tastatt Assures Expanded Productions"]

> [Text] Technical progress in aviation can no longer be measured in simple categories such as "faster, further, higher"; progress today is more differentiated and less apparent to the outsider. Probably the least conspicuous are the "little black boxes" called avionics equipment, without which modern aviation is unthinkable. It is as important to the aviation industry as fuselage and engine. And it almost appears as if avionics is only just in its beginnings, because technical development in this ares is faster and more radical than in all other areas in aviation. If one looks at 15-year-old radio equipment in planes and gliders and compares the first transponders with those of today, it quickly becomes apparent that here development has been far stormier than in fuselage construction and particularly engine construction. One certainly need not be a prophet to be able to predict that avionics will gain even more significance in the future. The United States is the leader in the marketing of avionics equipment, just as it is for fuselages and engines. In spite of that, one German firm has succeeded in competing on the international market: Becker Avionics.

It was not easy for Becker Avionics to compete with American avionics and navigational manufacturers and to secure a place for itself in the international market, but it succeeded. Max Egon Becker started in 1945. At that time when it was difficult to believe in any future at all, Becker effectively realized his idea of installing radios in automobiles. Although a car radio was at that time a pure hobby and an expensive luxury item, its necessity in today's traffic can hardly be disputed--just as avionics equipment is an intrinsic part of an airplane today. Who would still fly "NORDO" today?

Becker was able to build on his experiences in car radio production. The quality of his products, the efficiency and technical standard of his enterprise strengthened his resolve to enter the radio- and navigation equipment business as well. As a result, Becker Avionics was founded and established at the Baden-Baden airport in 1956. It goes without saying that today, more than 20 years later, completely different demands must be made on an industrial firm. Continuous increases in production and new technology in development, research and production could no longer be housed in the old buildings. A new building had to be found.

New Plant in Rastatt

Plans for a new building at the Baden-Baden airport had existed for a long time, but fate decreed differently. The former production installations of ITT-SEL in Rastatt, only a short 30-minute drive from Baden-Baden, were up for sale and could be taken over by Becker almost immediately. To be sure, this move meant having to forgo the presence of an airport, but there were other, more important reasons for this solution:

A modern, suitable and efficient production site was available immediately. There could be no long waiting period occasioned by new construction;

The new plant in Rastatt also offers optimal location with respect to traffic, with its own rail connection and proximity to freeway and airport;

The new production areas, four times larger than those in Baden-Baden, hold promise for the future. There is still room -- nothing stands in the way of a possible expansion of production or a necessary new installation.

International Presence

The Becker Avionics firm is especially proud of its international customer list. There is a colorful, almost exotic mixture of addresses of airports and private, commercial and military owners of planes with the names of internationally known sports and professional pilots. The "Paris Orly" airport is among them, as well as the New Zealand Aerospace Hamilton," the "Thailand Border Police" or "Ohanagan Helicopters."

In Indonesia, for example, all minor airports are equipped with Becker ground stations; the larger airports use Becker ground stations for emergency backup. This list could go on for pages and include the most diverse types and categories of aircraft.

Rising Sales

Becker Avionics is Rastatt presently employs 220 workers. Total sales in 1979 amounted to DM 20 million, with a 10-percent increase expected for 1980. This places Becker in second place behind the overpowering competition in the avionics field from the United States.

The future director, P.M. Kerry, sales manager Wolfgang Doerner and technical director Eberhard Gruenewald explained the Becker organization to AEROKURIER in Rastatt. The following firms are part of a holding company: Becker Auto Radios; Becker Auto Telephone; and Becker Avionics.

Worldwide representation is secured by Becker Electronics, United States, Becker Electronics, Taiwan, and Becker do Brasil.

A company-owned organization in France assures sales and service there. There are plans for further expansion later this year by creating corresponding organizations in Austria and Switzerland.

This international service network instills a feeling of security in the pilot who flies with Becker avionics equipment. In France alone, he has 23 Becker service stations at his disposal at large as well as small airports. Should he have problems with his radio or navigation system, he will find help and service anywhere.

For Becker, maintenance and customer service are more than just advertising slogans; they are a very intensive part of active company policy, because only a satisfied customer remains a customer. The mobile Becker service station, highly esteemed in glider circles, was represented at 10 championships in 1979--among them the Italian International Glider Championships in Rieti, the Coupe d'Europe du Vol a Voile in Angers, France, the German Glider Championships in Brueckeburg, and others.

And it does not matter if a competitor's radio equipment has to be repaired. What counts is that a glider pilot in hard competition is given help.

No Private Sale

The sales and service concept focuses completely on the cutomer. In spite of that, however paradoxical it may sound, the Becker Avionics trademark is: No direct sale to private customers. Nor do they wish to be concerned with dumping prices. The reason is simple: Only an economically intact sales and service network can offer the kind of customer service which can and must be expected of modern avionics. Only this way can the extensive warranties (2 years for the COMM-2000 devices) be guaranteed everywhere and at every service station, even abroad. And customer service is carried out uniformly everywhere.

Subsidiary DLE

At present, there are a total of 23 sales and service stations for Becker Avionics in the FRG. Five of these stations belong to German Aviation Electronics (DLE), a subsidiary of Becker Avionics.

Military Electronics, Ltd (MEG), is another subsidiary of Becker Avionics, with headquarters in Baden-Baden. It deals primarily with maintenance and repair in the military field, especially of direction-finding and testing

devices for search and rescue. In addition to routinely installing avionics equipment, DLE also equips so-called "avionics prototypes." The French TB 10 Tobago, for example, or MBB's [Messerschmitt-Boelkow-Blohm] Turbo Flamingo is completely equipped with Becker Avionics equipment. The French touring and commercial helicopter AS 350 Ecureuil is presently being equipped for the LBA license, and a Becker concept is already in existence for the German-Japanese BK-117 multipurpose helicopter.

Program 2000

These few examples alone show how diversified an avionics program has to be today. Becker offers an extensive product mix ranging from the VHF voice radio to navigation- and radio compass installations, transponders and auxiliary equipment to permanent ground stations. Gliders, light pleasure aircraft, helicopters and commercial IFR [instrument flight rules] planes can be completely equipped with Becker Avionics equipment, and the equipment can be assembled in accordance with customer wishes. Standard measurements and uniform design offer the advantage that the devices can be installed rapidly in prepared consoles and that the selector switches and control windows are located in the same place on all devices and are easy to operate and monitor. And a uniform and easily monitored panel serves not only optics but flight safety as well.

COMM-2000

The star of the Becker program is the 2000-series. The portable VHF voice radios of the COMM-2000 series are so-called single-block, plug-in modules. The times when controls were in the console, with a huge and heavy transmitter and receiver elsewhere in the plane, are finally passe. The entire device, in the standard measurements of the ARINC norm, fits into the console. Installation and dismantling are simple; the modules can be inserted and checked over right in the equipment and are exchangeable. A short overview of the Becker COMM-2000 program follows:

The AR 2008/25, category III, with 2 to 3 watts of transmitting power, with a safe range of operation of from -15°C to 55°C, is especially suited for light planes without their own electric wiring system, power gliders, gliders and dirigibles;

The Becker AR 2009/25, category II, with a transmitting power of 6 to 8 watts and intercom system, is the standard equipment for VFR [visual flight rules] and IFR aircraft up to wing surface 200; the temperature range is from -15°C to 55°C;

The Becker AR 2010/25, category II, with a transmitting power of 6 to 8 watts, intercom and self-test systems, is especially for IFR-equipped pleasure and commercial aircraft; the temperature range is -40°C to 55°C;

The Becker AR 2011/25, category I, with a transmitting power of more than 10 watts, intercom and self test systems, is suited for all commercial IFR-licensed aircraft; the temperature range is from -46°C to 55°C.

NAV 2000

The NAV-2000 system is designed for modern radio navigation. The individual components range from the simple VOR [VHF omni-range] receiver to the complete ILS [instrument landing system]. On all 200 channels in the frequency range between 108.00 and 117.95 MHz, the frequency selection switch can also control a late model DME-device with y channels. Plug-in modules for glide-path and markers as well as integrated indicator devices complete the system.

NR 2029: NAV-receiver/converter for VOR and LOC; just like with the COMM systems of the 90 series for the sportpilot, the smallest practical basic equipment can be expanded with a separate GS-MKR-[ground speed] receiver for ILS systems;

NR 2030: VOR/LOC receiver; can be combined with various indicator devices; suitable for VFR and IFR equipment;

NR 2020/20: VOR/ILS receiver with integrated GS receiver and DME remote control switch. Can also be connected to integrated compass/NAV indicators of other manufacturers. A device with 40 GS channels is designed especially for commercial IFR operation.

Four different indicators (NI 2020,2030,2040 and 2041), ranging from the simple LOC to the integrated cross indicator with three marker lamps, offer several combination possibilities;

ADF 2000: at present the smallest and lightest radio compass system with digital indicator, in a frequency range between 200 and 1799 kHz, adjustable to 1-kHz intervals. A combined LOOP/SENSE antenna for the ADF 2000 was licensed by the LBA only in December 1979;

ATC 2000: Transponder with 4096 coding possibilities, mode A/C; temperature range -20°C to 55°C; Ident-key;

AL 3 monitoring and intercom systems and the homing devices ZG 2/ZVG 2 in the VHF range or ZG 3/ZVG 3 in the UHF range, as well as an emergency power supply, complete the list.

GS 2000: In addition, Becker Avionics offers the possibility of using radio telephone equipment in stationary or mobile ground stations. The GS 2000 can be delivered as a 2-channel, 8-channel or 720-channel system; it can be for portable use, assembly room use or for installation in air traffic control consoles.

A totally new portable ground radio station powered by solar energy passed its field test in 1979 on a Greenland expedition.

COMM/NAV equipment had originally been planned for civilian aviation only. The fact that even military aviation in some countries has decided in favor of Becker equipment is proof of the quality and the high demands which the equipment has met over many years.

The Becker firm points with pride to the long running times and low breakdown rates of its equipment. This is confirmed by two figures: The rate of breakdown of all Becker aeronautical radio equipment under warranty amounts to less than 1 percent today; the median life without trouble (according to a Norwegian statistic) consists of 2,000 running hours (MTBF).

But in addition to all helicopters of the Federal Border Police, civil defense and the police in the FRG, Becker Avionics also supplies avionics for antitank helicopters and the Alpha-Jet. Internationally, special emphasis lies on helicopter avionics. Becker's participation in supplying equipment for civilian aircraft for general aviation in the FRG amounts to 35 percent; for voice radio systems it amounts to as much as 60 percent.

Quality Guarantee

The quality of production and of each individual device is the ultimate reason why Becker Avionics has secured for itself a place among the best avionics manufacturers. The name of the concept is quality guarantee, and it is pursued at great expense from purchasing through distribution.

Manufacture is controlled to the same degree according to civilian as well as military aeronautics equipment test regulations. The essential testing boards are:

Equipment testing: As the last step of the manufacturing process, every device is extensively tested for acceptance. This includes an endurance test of at least 24 hours, temperature cycles in the heat test and the cold room and an aging process in order to prevent tolerance variations as far as possible. Weak components already break down during the artificial aging process;

Quality control: After acceptance each device is subjected to an additional control which is independent of manufacture. During manufacture, independent quality testing is also carried out on individual components selected at random;

Quality guarantee: Finally, an additional random testing of the equipment is carried out.

New Developments

The future program is likely to interest a wide circle of readers.

The glider pilot, for whom the AR 2008 was too large, will presumably be able to buy from Becker before the end of this year a smaller voice radio designed especially for the instrument panel of gliders.

A DME device is already under development and will be on the market in 1981. This completes the COMM-/NAV series.

Finally, Becker Avionics is also developing a new series with pre-programmable channels and digital indicator, but customers will have to wait approximately 2 years for this.

Photo 1. As field of application for the large number of COMM mountings in all types of gliders, here the cockpit of a Speed-Astir, equipped with the Becker AR 2008/25.

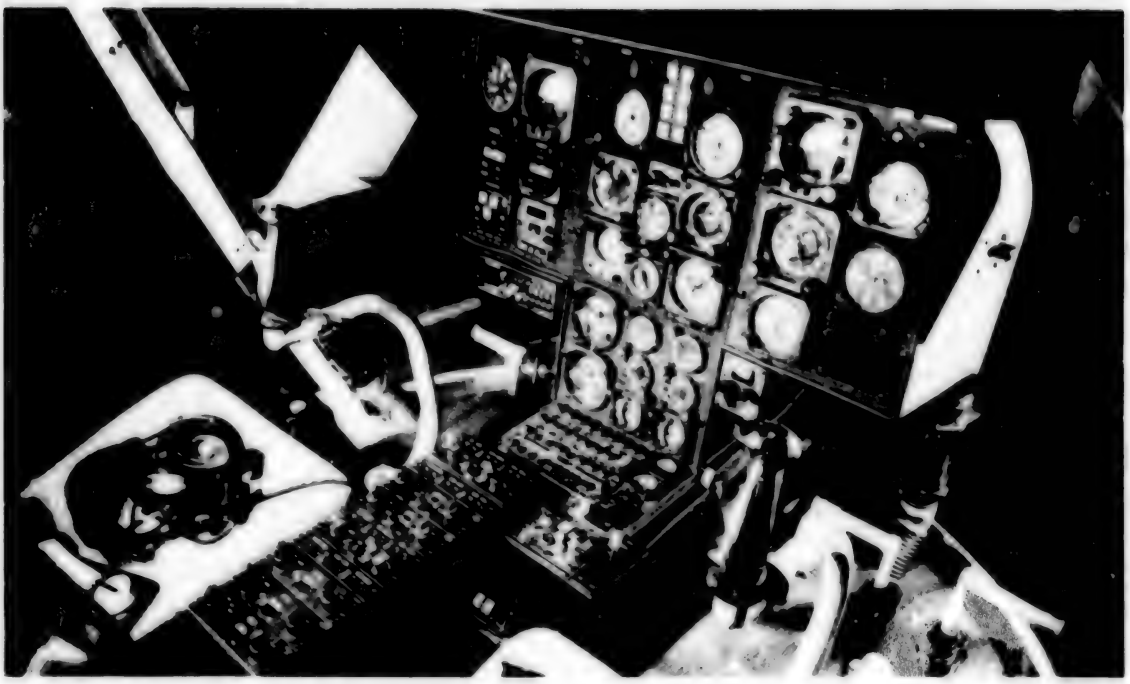


Photo 2. Becker Avionics in the service of police forces: Here the panel of a BO 105; IFR-equipped, with the communications systems, two navigation systems, an automatic direction-finder, a VCS 221 monitoring and intercom system and homing systems.

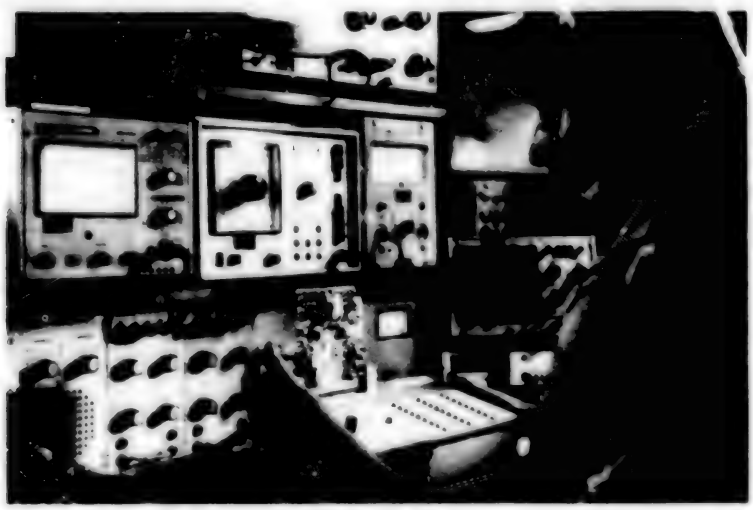


Photo 3. A practical control system as well as special adapters for each equipment series serve the high performance standards of Becker Avionics. Here the technicial is checking the permissible tolerances of a module.

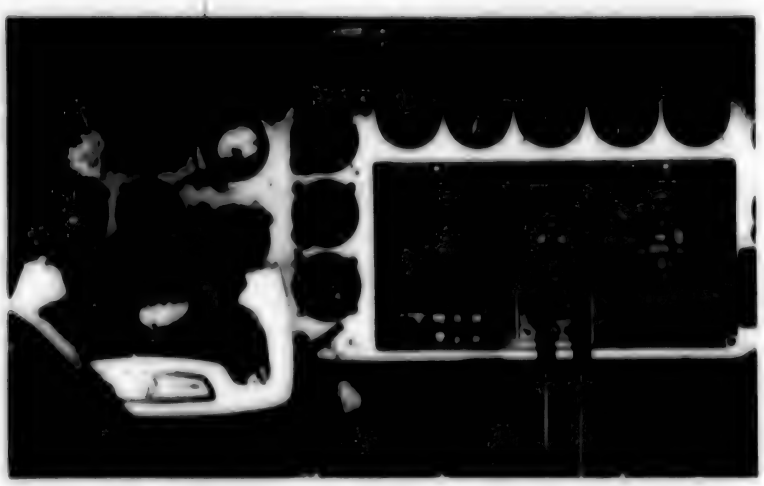


Photo 4. This view of the cockpit of a Beech Queen Air shows an IFR system with Becker-Avionics equipment: two voice radios, two navigation receivers with indicators, a radio compass with indicator and a transponder.

9328
CSO: 3102

HIGH-TENSILE SUPERCONDUCTORS FOR NUCLEAR INSTALLATIONS

Munich SUEDDEUTSCHE ZEITUNG in German 23 Jan 80 p 11

[Article: "Superconductor for Fusion Reactor"]

[Text] After several years of development work in the Nuclear Research Center at Karlsruhe (KfK), superconductors which exhibit about twice the tensile strength of steel have been successfully produced. The individual conductors consist of commercial carbon fibers, or filaments, about 7 micrometers (millionths of a meter) thick which are coated with a superconducting layer about 0.5 micrometers thick of niobium carbonitrite, a carbon-nitrogen compound of the metal niobium. The manufacturing of such superconductors could prove to be a significant step for the construction of the magnets for future fusion reactors since they demonstrate a--to date--unique combination of mechanical strength, critical temperature, current carrying capacity and technical workability.

In the case of fusion reactors, in which the 100 million degree fusion plasma will be contained by magnetic fields of up to 12 Tesla (corresponding to about 200,000 times the earth's magnetic field), the magnetic coils will be subjected to extremely high mechanical loads. Through the use of appropriate strength values, it must be assured that the superconductors are able to carry these loads without deformation. Deformation of the material could, through the heat generated in the conductor, lead to a sudden loss of superconductivity, that is, a reversion to the normal conducting state. The resulting sudden release of the electrical energy stored in the strong magnetic fields can destroy the magnetic coils.

The superconducting carbonitrite layer is produced by continuous deposition from the gaseous phase. In this process, metallic niobium, released from vaporized niobium chloride in a hydrogen atmosphere at about 600 degrees C, is first deposited on the carbon filaments. Next, the deposited niobium layer is converted into the superconducting carbonitrite in an atmosphere of ammonia and methane at about 1,000 degrees C. The process was operated continuously with cables of several thousand filaments, whereby the high tensile strength of the carbon filaments (up to 4,000 Newtons per square millimeter) was retained. This corresponds to about twice the tensile

strength of high-strength steels. An additional important parameter of superconductors is the critical temperature, above which the superconducting state can no longer be retained. This critical temperature lies, in the case of all technical superconductors, a few degrees above absolute zero, or zero degrees Kelvin (-273 degrees C), and should be as high as possible with respect to the technical application. Through suitable process control, a critical temperature of about 18 degrees Kelvin (-225 degrees C) can be achieved, a suitable value for technical applications. Through the two-stage chemical process and continuous pulling in this new process for producing the superconducting coating, there exist special opportunities to influence the crystallographic microstructure, which is important for achieving high current carrying capability with strong magnetic fields. Measurements of current density gave values up to 1 million amperes per square centimeter.

Future developments are aimed at fully exploiting, also at high magnetic field strengths, the known high current-carrying potential of the superconducting compound used, by producing an even finer crystallographic microstructure. The development work has been going on in the Institute for Technical Physics at the Nuclear Research Center, Karlsruhe, in collaboration with the Institute for Chemical Engineering at the University of Karlsruhe for about the past 2 years with an expenditure of DM 400,000 to date.

9160
CSO: 3102

FOURTEEN PLANTS FOR COAL LIQUEFACTION, GASIFICATION

General Plan

Munich SUEDDEUTSCHE ZEITUNG in German 31 Jan 80 p 8

[Text] Last Wednesday the Bonn Government took the first decision on the large-scale production of gas, oil and gasoline from hard and brown coal. The cabinet had to hand a total of 14 projects submitted by industry, with a combined investment volume of about DM13 billion. At the conclusion of an 18 months advance planning stage during which the costs and risks of the facilities are to be reliably ascertained, the firms and the government will arrive at final construction and financing decisions. Bonn assumes that industry will shoulder a substantial proportion of the risks and costs.

The Federal Cabinet decision initially amounts to the promotion of some advance planning studies required for the implementation of the synfuel program based on coal and proclaimed by the Federal Chancellor on 4 July 1979. The Federal Government will make available about DM70 million for such studies in 1980 and 1981. North Rhine-Westphalia will finance another three advance planning studies. The firms involved will, to this end, carry out basic planning of the technical layout, siting, environmental aspects, time schedules, costs and economic efficiency. Federal Research Minister Volker Hauff stressed to Bonn reporters that the Federal Government expects significant results with respect to coal gasification by late 1980, to coal liquefaction by mid-1981.

The Federal Government assumes that realization of the planned 14 facilities (11 for coal gasification, 3 for coal liquefaction) will be able even in the early 1990's to replace only a small percentage of present-day oil and natural gas imports. Still, they will provide the prerequisite for the future borad industrial utilization of coal processing. The new coal technologies are to help not only in raising production and employment in industry but also to encourage exports of such plant.

If all 14 projects are completed as planned, the Federal Government assumes an additional demand for about 12 million tons of hard coal and 10 million tons of brown coal per annum. In the opinion of energy experts this additional demand can be met from domestic production, provided substantial investments are made in German hard coal mining. At the same time conservation of brown coal is to be achieved by the construction of new nuclear power plants. Coal needs exceeding the estimates would have to be met by imports.

The Federal Government expects environmentalists to object to coal processing also, especially because the majority of the projected plants are to be sited in already heavily polluted regions such as the Ruhr and the Saarland. It is intended therefore to begin by reducing the prior burdens on these locations, especially by the expansion of district heating networks, and the replacement of obsolete hard coal power plants. Environmental problems are to be frankly discussed with the public.

So far neither coal gasification nor coal liquefaction can be handled so as to yield a profit. Closest to the profitability threshold is gas production from brown coal. Liquid products and locally produced gas may now carry from twice to quadruple the price tag of oil products. Even when using relatively cheap imported coal, costs are twice those of oil. The enterprises of the energy industry and plant construction expect, though, that these cost ratios will shift decisively toward coal from the mid-1980's on. At the same time Bonn considers that the use of coal to replace heavy heating oil in industry and power plants as rapidly as possible will be far more economical and efficient for the purpose of reducing our dependence on oil. The potential still awaiting development here is estimated at about 20 million tons per annum.

Against the background of the efforts for the long term profitable processing of German hard coal Federal Economics Minister Otto Graf Lambsdorff considers future mining potential rather than present sales guarantees to be the major topic of German coal policy. The minister reported to the cabinet that the mining firms believe it possible to raise output from 87 million tons now to 95 million tons of hard coal by the end of 1990. Whether production can be further raised will depend on the exploration of new workable deposits, the development of coal prices in the world market and the resolution of the manpower problem.

Opposition Reaction

Munich SUEDDEUTSCHE ZEITUNG in German 31 Jan 80 p 25

[Text] German industry reacted with amazing speed to the Federal Chancellor's offer of 4 July 1979 to encourage the construction of large-scale plants for coal gasification and coal liquefaction by generous government financial aid. Already last Wednesday finished project studies were before the Bonn Cabinet, ready for adoption. The promotional package is certainly

most tempting for all those involved: On the one hand for the enterprises of the energy industry and plant construction, whose high planning and development costs will be refunded from tax moneys; on the other for the Bonn energy politicians involved, who expect coal processing projects to allow domestic hard coal once more to claim a greater share in primary energy output, thereby providing a sensible contribution to the reduction of our dependence on oil.

No doubt even the experts in the Federal Ministry of Economics are still unable at this point to completely appraise the financial adventure upon which the Federal Government has embarked. It is a fact that oil and natural gas derived from coal can still not be produced and offered at competitive prices, despite the rampant oil price inflation of recent years. In the late 1980's, when the first major plants will come on stream, these price ratios might look much better. That may but is not bound to happen. The Federal Government is therefore well advised to gear up to the subsidized operation of the hydrogenation plants which it will hardly be possible at a later point to scrap as investment ruins.

Despite the enthusiasm with which government and industry threw themselves into coal processing in the course of recent months, environmental problems --similar to those involved in nuclear energy--already loom large. However plausible the intention to locate coal processing in the closest proximity to coal mining, such a combination is likely to be a highly sensitive issue in many regions. Already many experts fear that the hydrogenation plants will primarily turn out to be giant polluters. Does that mean the rejection of coal processing also? Let us wait and see.

Infighting Over Plant Construction

Hamburg DER SPIEGEL in German 4 Feb 80 pp 45-49

> [Text] Two firms, part-owned by the Federal Government, are disputing the construction of a large-scale coal liquefaction plant planned for the Ruhr District.

Fritz Oschmann, chairman of the board of the Gelsenkirchen Veba Oel AG, adopts the local dialect to define the goals of his firm: "We intend to come up with quite something." As to his immediate aims, Oschmann is planning one of the largest industrial projects ever tackled in West Germany: Constructing a giant plant to convert coal into gasoline.

The Federal Chancellor had provided the incentive for the technical feat. In his government declaration of July last Schmidt announced that the Federal Government intended "by every means at its disposal" to push ahead with the production of oil and gasoline from coal. Plants were to be constructed, which would secure for German industry the "top status on the world market."

A few weeks later Economics Minister Otto Graf Lambsdorff invited the energy firms to submit proposals for the construction of coal processing plants. Research Minister Volker Hauff announced that he intended to spend several billions to encourage the new technology. Last Wednesday the Federal Cabinet made available the first DM70 million for advance planning.

The rain of money from Bonn did more than attract the Veba management. The Gelsenkirchen oil firm was joined by Essen Ruhrkohle AG and Saarbergwerke AG which also bid for the contract to convert hard coal to gasoline.

The government, for its part, is willing only to subsidize two liquefaction plants--a smaller one in the Saarland and a larger one on the Ruhr--the managers of Veba Oel and Ruhrkohle respectively are disputing this major contract. Officials in Bonn's Ministry of Economics had expected the two firms to join in the construction of the Ruhr plant.

Their belief was due to the fact that the Bonn Government is a stockholder in both firms. In addition Veba and Ruhrkohle have for some time past collaborated on coal hydrogenation.

The two firms are now constructing a coal-oil pilot plant in Bottrop; from 1981 on this is to process 200 tons of coal daily. Ruhrkohle holds 60 percent, Veba Oel 40 percent of stock in this joint project.

Now, though, Veba Oel is no longer content to be the junior partner. Veba's Oschmann would like to be either the sole operator of the giant facility planned on the Ruhr or at least take charge of the project.

Ruhrkohle chief Karlheinz Bund, on the other hand, rejects the implication that mining should continue in its role only of underground toiler. In his opinion the industry must seek new marketing opportunities by involvement in processing technology.

Werner Peters, manager of the Mining Research Institute (financed by the mines), supports Ruhrkohle AG's leadership claim in the matter of hydrogenation. He says that "the initiative was clearly assumed by us."

Mining researcher Peters and his specialists began preparatory work on coal hydrogenation as early as 1973, in the wake of the first oil crisis.

Initially Peters brought together those engineers who had constructed and operated hydrogenation plants in the era of the Third Reich. With the help of these "old hands" he built a pilot plant on the site of his research institute in Essen-Kray. This converts about 200 kg of coal to gasoline daily.

The pilot plant has been operating since 1976, without any major malfunction. The Ruhrkohle researcher used it as a model to plan a coal-oil pilot plant in Bottrop, which is to be a thousand times larger. According to Peters "at that time Veba showed no signs of interest."

In other countries also the mining firm is involved in several coal liquefaction projects. It holds a 25 percent share, for example, in the planned coal-oil plant to be built by Gulf Oil Corporation in West Virginia. By 1984 this plant is intended to process 2 million tons of coal per annum.

According to the Ruhrkohle managers the knowledge and experience gained in this project provide "optimum conditions for the planning, construction and operation" of domestic coal processing plants.

However, the Veba people also claim to have genuine know-how. Chairman Oschmann boasts that no other German firm can match Veba Oel's experience in gasoline production. And that, he says, applies to gasoline production from coal as well as from oil.

In fact coal-based gasoline was produced in Veba's Scholven plant near Gelsenkirchen as far back as World War II. When the war ended, the Veba people kept the old plant in operation until 1964, although from 1945 on oil residues were hydrogenated instead of coal.

And that is precisely the method by which Veba now intends to defeat Ruhrkohle: The oil people are planning a facility which will process coal as well as so-called heavy oil--an inevitable byproduct of oil refining.

Indeed, Veba technicians believe it possible to feed both raw materials into the plant at the same time and in varying proportions.

No doubt the Veba concept offers decided advantages by comparison to coal hydrogenation pure and simple. This is due to the fact that, at current prices, gasoline from coal costs twice as much as gasoline from oil, while it is already possible to produce gasoline from heavy oil at competitive prices.

Coal-based gasoline is so expensive mainly because triple the volume of coal is needed to produce a ton of gasoline.

The Veba people--and they are not alone--therefore consider it more sensible to hydrogenate heavy oil instead of coal, and to use coal primarily for heat production.

The Veba solution appears more advantageous also because coal will be rather scarce in the years to come. According to the calculations of Bonn's Ministry of Economics, even in the most favorable circumstances the FRG will have to import about 20 million tons of coal per annum from 1990 on.

It seems profoundly uneconomic to import triple the volume of hard coal per unit of coal-oil. Consequently Veba Oel chief Oschmann already contemplates successors to the refining plant now planned.

According to him the plant constructed on the Ruhr should, from 1990 on, serve only as a demonstration facility for the benefit of those countries where coal is plentiful and may be mined more cheaply than in West Germany. The coal countries will then be able themselves to hydrogenate their raw material--using plant made in Germany.

11698
CSO: 3102

FURTHER DETAILS ON GAS-BURNING OFFSHORE POWER PLANT

West Berlin DER TAGESSPIEGEL in German 28 Dec 79 p 25

[Article by Klaus Dallibor: "A Turbine Power Plant Shall Arise Over the North Sea." For related information see JPRS 74862, 3 Jan 1980, No 9 of this series, pp 18-19]

[Text] A steel powerplant colossus in the North Sea is to contribute to better utilization of the domestic energy reserves of the FRG, which is poor in raw materials, in a few years. Within the scope of project EPOS (Electric Power on Sea), the Northern German Powerplants (NKW) will tap one of the numerous gas pockets occurring in the southern part of the North Sea and erect above it a mobile installation for producing electricity. The entire project, without precedent worldwide, is still on paper, since for its realization a sufficient number of gas deposits still have to be found and opened up.

As the first location, the NKW planners are considering a region in North Sea block H-13; it lies about 80 km west of Helgoland and 80 km from Emden. The electric company secured a concession there a short time ago from the American Atlantis Group. To obtain exact information about the potential yield of the already proven gas deposit, a guaging hole will be sunk in the second quarter of 1980 at an estimated cost of DM 20 million.

According to the German government, the "offshore power plant" could make a significant contribution to better utilization of domestic supplies and at the same time demonstrate internationally the performance of German marine technology. Therefore, Bonn is supporting the pilot project with about DM 10 million.

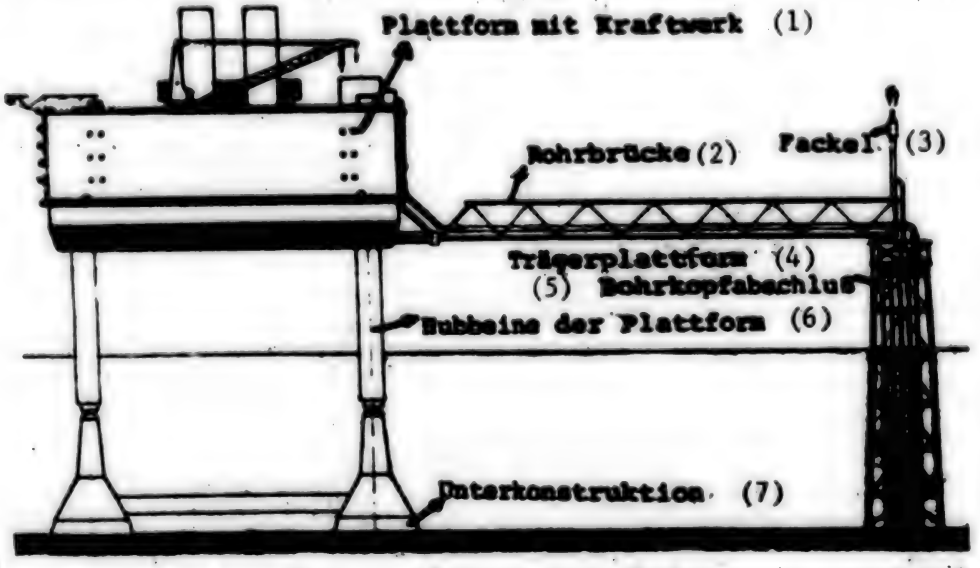
The total cost of the steam-turbine power plant with a planned power of 350 MW could amount to about DM 500 million. The facility can only reasonably be used with sufficiently large gas deposits having the longest possible life. The NKW engineers believe that wells of from 5 to 7 billion cubic meters will suffice; these would permit a power plant to remain at the same location for 12 years. When the supply is exhausted, the installation can be towed to another location.

The platform is built as an elevatable island. The powerplant rests on a floatable upper part which on location is secured to a previously sunk and anchored lower portion. The upper part is elevated to the operating position about 25 meters above the surface of the sea without the help of a crane. The installation, which will be fabricated on land, will be connected with the drilling and production platform by a pipe bridge. Engineeringwise, the construction of such a mobile power plant is straightforward, according to NKW information.

The platform with the compact power plant could be built and ready to supply the mainland with electricity via high-voltage direct-current cables in about 3 years. The technique for laying such underwater cables was researched while developing the network between Denmark, Sweden and Norway.

To protect against damage, the prospective general contractor, German Babcock, will bury the cable about 1 meter under the sea floor using a hydraulic trenching sled. The generating cost per kWh will lie between the costs for energy generated from atomic sources and from imported coal, according to NKW.

The special advantage of the new, and until now unique, power plant lies in the potential for exploiting marginal, thus small or minimum value, gas deposits. The experts are of the opinion that the marginal deposits of the southern North Sea will permit the construction of power plants with a combined power of 4,000 to 8,000 MW. The water depth in this region lies between 25 and 80 meters. Locations up to 400 km from the coast still offer economical utilization.



Zeichnerische Darstellung des geplanten Kraftwerks auf der Nordsee. dpa/UPI-Bildfunk

Sketch of Planned North Sea Power Plant

Key:

1. Platform with power plant
2. Pipe bridge
3. Flare
4. Pipe support platform
5. Casing head cap
6. Platform lifting legs
7. Foundation

9160
CSO: 3102

CRITIC REVIEWS FRANCE'S TECHNOLOGICAL POSITION, PROSPECTS

Paris LE FIGARO in French 15 Dec 79 pp 70-71

[Article by Michel Poniatowski: "The Technological Shock: A Shock for France?"]

[Text] The United States, the USSR, Eastern and Western Europe, Canada and Japan have knitted such intricate cultural, commercial, scientific and technological ties that they form one international body, that of the developed countries.

France, fifth industrial power and third exporter on earth, is, for the moment, among the top countries of this group.

Each of its members participates on a global scale. Each has a vast domestic market: 217 million Americans for the United States, 114 million Japanese for Japan, 260 million European consumers for France.

Each country is at the same time competitor and partner. Anything that happens in one of these countries inevitably produces some effect in another.

Our country's position is due at the same time to its past as a great colonial power and, since 1958, to the rise of its industry caused mainly by the opening of our frontiers to Europe.

For several years our industry has had a spectacular development of over 5 percent per year, a record rate of expansion which has placed France right behind Japan.

But the world changes and it changes very fast. Political, social, technological and scientific disagreements arise or will arise. Nothing is established, especially for France.

France's position is dangerously fragile. It has few raw materials. Presently, it has little fossil fuel, and that of poor quality (coal, petroleum). It is rather small and averagely populated. It has one of the most progressive social protection systems in the world and ought to keep it. But it is burdensome and expensive.

In 30 years, our country has become a sort of huge factory of change, powerful but vulnerable:

--France must be solvent to buy its raw materials;

--France must be competitive to buy finished products on the international market.

A paradox to be stressed is that the closer and more important the ties uniting France with the rest of the world--and especially to the community of developed countries, the more fragile and vulnerable France is. These ties deserve to be recalled:

--one-fifth of France's production is exported.

This is a high proportion. The United States and Japan export less than 10 percent of their output.

--70 percent of our imports come from the community of developed countries;

--73 percent of our exports go to this same community.

Any lasting fluctuation--arise in our imports, a decrease in our exports--can shake France's position.

French industry is currently experiencing dazzling export successes. These must not hide the future from us or excuse us from gaining on tomorrow's world. Technological and scientific innovations accelerate. Several months' lag behind our competitors can mean decadence in certain industrial sectors. This year our industrialists have truly realized the awesomeness of automatization movements taking place in Japan. And in good time, since beyond the present dazzling results of our foreign trade, formidable weaknesses are outlined:

a) Our trade deficit results not only from trade with petroleum-producing countries, but also with:

--Germany, Fr10 billion deficit,

--the United States, Fr7.5 billion deficit,

--Japan, Fr5 billion deficit.

That means that, should this tendency continue, France would be overtaken by high-technology countries.

b) The consumer goods sector is one of the strongest of the French industry. However, due to industrialization of Third World countries, this strength will in time become a weakness. The competition of these countries, who use

modern technology and have cheap labor almost without social burdens, is growing stronger. Their share of the world's industry can go from 8 to 20 percent between now and the year 2000. Half of American consumer goods imports already come from the Third World. Thus, Taiwan, with 17 million inhabitants, manufactures up to 400 million pairs of shoes at a unit cost of production of Fr3 compared with Fr22 in the EEC.

Our country shows a regrettable weakness in the field of electric and electronic consumer goods: the French market is flooded by German, Italian or Japanese products, now in the process of being replaced by Third World exports.

In the agriculture and foodstuffs field, France does not take full advantage of its competitive agriculture, and exports too many unprocessed products. A projection of the present evolution shows that France risks being caught between the highly developed countries and the developing countries.

Now, there is no position in between. France will not be able to compete in certain products with the underdeveloped countries except by automatizing its production. In other "refined" products, France must rely on its labor and high technology. It must produce goods which, for their price and quality, will be in demand throughout the world, including in the most developed countries.

The technological shock is an opportunity for France.

Massive usage of teleprocessing, telecommunications, robots, lasers, nuclear power, industrial genetics and new and awesome biological discoveries will in a few years transform our view of the world, ourselves and our actions.

Distributed data processing is coming into general use. Computers are becoming commonplace in worldwide networks. Lasers allow access to huge volumes of information as well as high speed processing of this information. All this contributes to making information and data the raw materials of commercial exchanges in 1990.

Industrial genetics controls evolution of microorganisms, making bacteria assume industrial functions more precisely and efficiently that traditional industries. These discoveries open up many new frontiers in the fields of pharmacy, metallurgy, agriculture, petrochemicals, water treatment and even energy.

Existing technologies will age rapidly. In the current community of developed countries, it will be expensive to pioneer, but even more expensive to lag behind. This technological shock is an opportunity for our country, since, if we know how to take advantage of it, we will establish our position among the most advanced of the developed countries.

We must insure a massive readaptation of our traditional sectors, inherited from the 19th century, toward modern and future sectors. It is not a matter of abandoning traditional sectors from the automobile in iron metallurgy. Quite to the contrary, it is a matter of transforming them into future sectors oriented toward a vast range of products. For this reason, it is essential to improve their competitiveness against developing countries by using advanced technology: automation, numerical control machine tools, integration of manufacturing processes. These technologies already make it technically possible to reduce the number of production workers by 30 to 90 percent.

The Rand Corporation points out that the American economy's current production level of manufactured goods could be achieved with one-third less personnel.

For 1985, Japan plans to have an automobile factory without, or almost without, workers.

This is tomorrow's reality: these sectors will create wealth but they will not directly create jobs: every time a machine replaces a worker, it means new wealth for society. This wealth will necessarily be distributed in new investments or in consumer circles through the intermediary of revenues and salaries, thus creating new jobs.

To seize this opportunity, we must rely on the industries of the future: wealth and few jobs in the traditional sectors but, on the other hand, development of employment for the new generations in those sectors where there will be competition in the group of developed countries to which we belong. Some races are already well under way in France.

--In the nuclear field: In 1985, close to 55 percent of our electricity will come from nuclear powerplants. Due to the dynamism of its technologies, France rises to the top of the world in civilian nuclear power. If the effort is maintained, France will have considerable advantage tomorrow to produce liquid hydrogen, which will replace petroleum.

--In data processing: France has the first European industry in importance, quality of manufacturing and quantity of exports. But effort must be increased to carry data processing to all sectors of society...We should be aware that Japanese officials are already relying on data processing to establish new growth capable of relieving that of classic industrialization without pollution and inflation.

--In telecommunications: Our country is at the top of world industry in this sector.

--In space: We are in third place, behind the two superpowers.

Many other races can be won but victory requires imagination, creativity and lots of work: fundamental research, biotechnology, automation, exploitation of the oceans, teleprocessing, struggle against pollution, improvement of the environment, new energies, exploitation of natural or artificial biomasses, new materials and their manufacturing techniques, etc....

These new sectors will create new jobs. Globally, they will compensate for losses due to automatization of traditional sectors. To these will be added all the jobs for services, recreation organization, arts and crafts, commerce, education, recycling, etc. surrounding these new sectors. The difficulty of our situation does not lie in the absence of jobs, but in the fact that new jobs created tomorrow will not be of the same nature as those which are endangered today.

This change in the nature of jobs calls for deep thinking from the state, business and labor unions. It assumes that through automatization we will preserve our position in the traditional industrial sectors and respond to our fellow citizens' aspirations for security, while concentrating our efforts on the industries of the future, creators of wealth and new jobs. It is an evolution which will not happen by itself. It implies willful action from the state and the social and economic sectors. The future will not shape itself: it will require a clear and deliberate action toward the goals to be achieved.

9341
CSO: 3102

ENERGY EXPERT INTERVIEWED ON NATION'S ENERGY POLICY

Paris AVATION MAGAZINE INTERNATIONAL in French 15-31 Jan 80 p 19

[Interview with Andre Moynet, World War II fighter pilot; presently a test pilot--date and place not given]

Andre Moynet

Andre Moynet, a brilliant fighter pilot during the war from 1939 to 1945, has also been a test pilot. In politics, he has specialized in energy problems.

[Question] Of France's expenditures for petroleum industry on the whole, as an energy consumer, accounted for 45.9 percent in 1978. In this connection what is the magnitude of the aeronautical industry?

[Answer] At the outset, let me remind you, we must separate the industry, properly speaking, and the utilization aspect, that is, transport.

In both areas petroleum expenditures, in any event, are quite small.

As a matter of fact, as far as the industrial aspect is concerned, the main activity has to do with construction of high technology equipment rather than energy consuming work such as is performed in the metallurgical sector as an example.

In the transport domain, particularly in terms of passenger-kilometers realized--supersonic transport excepted--it appears that commercial aviation is one of the least energy-consuming sectors. That is why, in a world wherein human contacts of every kind (political, industrial, commercial, cultural and so forth) must be increased, air transport will have an important role to play.

We must be aware, roughly speaking, that our expenditures for petroleum, which is the driving force for practically all sectors of our living, are distributed as follows: about 49 percent for heating, about 38 percent for industry, and 13 percent for all forms of transport.

Which is to say that within the 13 percent imputed to transport, the portion of aeronautics is indeed a small thing in relations to services rendered.

[Question] Assuming that the government assigns to you a mission related to energy problems, would you go so far as to propose that it favor, in its policy, high technology industries which are small consumers?

[Answer] I say simply this: considering the present political and technological situation I think that, whatever the importance of election results, there is an urgent necessity to act quickly in order to face up to what is a cover except in name. Whatever the political results, today, as in the last 18 months, the whole of the energy problem remains. And we must face it right now. At the political level, at the very top, it would be appropriate for the President of the Republic to have at his side a coordinator responsible for liaison with the various ministries concerned for the purpose of promoting development of new forms of energy for which we have the resources, and maximum utilization of these energy possibilities.

In fact, at the technical and technological level the western countries, and France in particular, have amply proved their ingenuity, and that is why this coordinator would be in position to obtain, from study offices and research centers, what they select as realistic solutions.

[Question] In what way have efforts to save energy been manifested in the aeronautical domain since the establishment of the Energy Conservation Agency in 1976 ?

[Answer] That is very simple. I do not believe that we must attach the efforts which have been made in energy matters in the aeronautical domain to the establishment of the Energy Conservation Agency. In fact, during the last few years efforts have been devoted to continuous research to improve the fluid mechanics and at the level of the aerodynamics of airframes as well as of propulsion units.

But these efforts result from following a proven industrial policy without any particular innovation. An example of the results: The Airbus is more economical than the Caravelle.

[Question] Lockheed is trying to demonstrate, by modifying its Tristar L-1011, that liquid hydrogen could replace petroleum some day. What do you think of that, and what other forms of replacement energy may be comtemplated?

[Answer] The Lockheed experiment, which will probably proceed slowly, considering the American industrial structure, will undoubtedly be positive. And it must be remarked that hydrogen, which can be produced in more or less different ways, will certainly play an important role in the development of new forms of energy.

But--to get back to the general energy problem--I should say that, aside from exploration of hydrogen, differences of pressure and of temperature can be the source of energy, and the density of water makes it possible to exploit such temperature and pressure differences within much smaller dimensions, whence will follow an aspect of miniaturization which is very positive as far as existing infrastructures are concerned (an example: a capacity similar to that of the Rauce [River] plant, in view of present technology, be concentrated within a volume of about 5 cubic meters).

Besides, France, which is surrounded by seas and the ocean, and which has available thousands of kilometers of waterways, is well situated to exploit such energy sources.

[Question] According to ICAO [International Civil Aviation Organization] experts, the consumption of transport aircraft will increase four-fold between the present and the year 2000. However, utilization of new energy sources should moderate the increase in petroleum fuel demand. What are your feelings on this point?

[Answer] The ICAO calculations seem valid on the basis of constant francs and constant technology but utilization of new forms of energy will make them invalid, especially to the extent that aviation will be limited to subsonic operating speeds.

On another plane, it behooves the western world, and France in particular, to give proof of energy self-sufficiency as quickly as possible. And in the day when the efforts will be convincing, it is certain that the attitude of the OPEC members will be quite different. For that reason we shall surely come to moderation in the prices of petroleum fuels, considering the proliferation of different energy sources.

[Question] For air transport there arises the problem of fuel availability. Can the French government guarantee to the French air transport companies, the supplies necessary to their growth at prices which are not prohibitive?

[Answer] Considering the relatively small portion of our petroleum consumption by air transport, and the importance of this sector in a modern world, it is probable that the government will be able to take the necessary steps to avoid hindering the companies' growth. For example, by decreasing the taxes on aircraft fuel. Let us remember that it was only a few years ago that everything which flew was completely untaxed....

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CSO: 3102

REFORM OF STATUTES REGULATING RESEARCH OUTLINED

Paris AFP SCIENCES in French 17 Jan 80 pp 1-2

[Text] Paris--Upcoming publication of decrees on "researcher statute"--A series of decrees is to be published very soon in the Official Gazette, amending rather extensively what is commonly called the "researcher statute." These decrees will supplement the current reforms concerning major research organizations such as the CNRS, INSERM and INRA. They will define the new principles and regulations governing scientific employment, particularly the conditions for recruitment, advancement, mobility, etc., of scientific personnel.

The National Center for Scientific Research (CNRS) has nearly 10,000 researchers, INSERM or the National Institute for Health and Medical Research has 1,300 researchers and INRA or the National Institute for Agricultural Research has 1,200 researchers and 800 high-level engineers. But to a certain extent, reform of the statutes will also affect teaching researchers, who are the most numerous, since it will be easier for them to work in public and private research.

For public agencies, the new statutes will have the advantage of "transparency" of recruitment, since the latter will be defined by more precise regulations, of certainly more selective but more rapid promotion and of giving researchers the opportunity--and also requiring them--to change for a certain period from a public research establishment to a private establishment and to undergo training in foreign laboratories without losing, but rather retaining, the advantages acquired.

The new statutes concerning CNRS and INSERM research personnel are rather similar, whereas it appears that those for the INRA set up a much more radical system. However, it is possible that the decree concerning the INRA will be published later. Thus INRA recruitment will be carried out competitively and the same will also apply for rising to the level of Master of Research. But the age limit of 27 years old, beyond which it is no longer

possible to submit one's candidacy for the INRA, will also apply to CNRS and INSERM, with some exceptions, particularly for those who will have pursued medical studies. "Probationary periods" generally limited to 4 years will be instituted at CNRS and INSERM, after which either the researcher will "rise" in rank and receive a commitment for an indefinite period or he will be advised that he is not suited for research and "still has time to change professions."

What is very new in the new statutes is the "mobility" requirement for advancements from the research assistant level. To attain new levels, it is essential to have left one's laboratory for another French or foreign laboratory or to have changed research topics, etc. . . . Moreover, the possibility of spending several years in some other French or foreign public or private organization, while retaining the benefits of the statute, should make it possible to establish these "bridges" and the decompartmentalization discussed so much. The alinement of remuneration for services between researcher and teaching levels will also facilitate university-research transitions and vice versa.

The new statutes also include a certain number of provisions regarding inventions by researchers, etc.

The new statutes will upset a certain number of customs, but it is said that they will assure those entering research of being promoted to higher levels regardless of financial fluctuations. . . .

Thus on 15 January, the Ministry of Universities published a communique stating that a series of budgetary measures, reflecting the government's intention to improve the career development of CNRS researchers, has been decided and will be the subject of a proposal in parliament by Mrs Alice Saunier-Seite:

1) Guaranteed access for 90 percent of junior research assistants to the level of full research assistant through the conversion of 1,205 junior assistant jobs to full assistant jobs between now and the end of 1983. Beginning in 1980, the Ministry for Universities will suggest that parliament make 335 additional conversions.

2) Conversion of 132 research assistant positions to Master of Research positions for the period extending from 1981 to 1983.

3) Alinement of initial index arrangement of research assistant positions with assistant university lecturer positions.

4) Between 1981 and 1985, the proposed budget of the Ministry for Universities will include the creation of at least 240 research assistant, Master of Research and director of research positions.

Moreover, about 400 members of INSERM (National Institute for Health and Medical Research) demonstrated on 15 January at the request of their trade unions to protest the draft decrees reforming the personnel statute.

These reforms are "a danger to the jobs of INSERM personnel and are aimed at placing public research in the sole service of private, industrial and commercial interests," the communique pointed out in the name of SGEN-CFDT [expansion unknown-French Democratic Confederation of Labor], SNTRS-CGT [expansion unknown-General Confederation of Labor], SNCS-FEN [expansion unknown-National Education Federation] and SNIR-CGC [expansion unknown-General Confederation of Managerial Personnel]. According to researcher unionists, this demonstration was one of a series of protests, over the last several months, intended to denounce the lack of planning with public agencies in regard to the "Saunier-Seite-Aigrain" reform.

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CSO: 3102

GEOTHERMAL DRILLING BELIEVED SUCCESSFUL

Paris AFP SCIENCES in French 10 Jan 80 p 24

[Text] Orleans--Hot water at 1,500 meters in the Orleans region: Geothermal drilling undertaken at the Melleray site in Saint-Denis-en-Val, near Orleans (Loiret) has just reached a depth of about 1,500 meters in the sandy layers of the Trias geothermal reservoir. The temperature is 70° and the features of the geological formations of the reservoir now being studied promise an adequate flow, pending confirmation of these results by production tests scheduled to begin soon.

The drilling project, whose foreman is the economic interest group GEOVAL, is to be used to heat 15.7 hectares of greenhouses now used by a dozen operators. The operation, the first within the European Economic Community (EEC), has met the energy needs of solely agricultural users to date, but when finished, it should result in the savings of some 4,000 tons of oil per year.

It has been carried out under the direction of the geothermal section of the national geological department of the BRGM [Bureau of Geological and Mining Exploration] with the aid of the Foraky-Foramines Company. Financing of this research drilling was ensured by a loan from the geothermal committee of the Ministry of Industry and aid from the EEC.

The overall investment for this operation has been placed at 17 million francs. In addition to the completion of this production drilling, it includes a reinjection well, a heat exchanger and the pipes to distribute the hot water in the greenhouses. The total investment amounts to under 5,000 tons for the equivalent of 1 ton of oil saved annually for over 20 years.

This project has made it possible to complete the results acquired through oil drilling done in the region and gain new scientific data of prime importance for the understanding of the region's geothermal potential. This initial result points to great possibilities of using geothermal energy to supply the needs of the cities, industry and agriculture in the central region.

Final results will be announced before the end of the month.

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CSO: 3102

FIVE-YEAR PROGRAM FOR UNDERGROUND OIL EXPLORATION LAUNCHED

Paris AFP SCIENCES in French 17 Jan 80 pp 6-7

[Text] The launching of a new national program to explore the subsoil over the next 5 years was decided upon at a meeting of the Central Planning Board devoted to the exploration and development of hydrocarbon deposits within the national territory. The meeting was held on 10 January at the Elysee Palace and was presided over by Giscard d'Estaing.

According to a bulletin from the Elysee Palace, the Board made the following decisions:

In areas accessible to current production techniques (metropolitan territory and continental shelf), the rate of prospecting will reach the level of 1 billion francs beginning in 1981.

In high-risk areas (where chances of finding oil are minimal) and in those inaccessible to current production techniques, a systematic survey will be undertaken. The cost of this program will amount to 1.5 billion constant francs over the next 5 years.

The program to develop ocean oil technologies will be stepped up.

The parapetroleum sector (engineering, equipment) will be the object of industrial development action, in keeping with decisions made at the Planning Board meeting on 4 September 1979 relating to the industrial policy.

The program to develop assisted oil recovery techniques (oils that cannot be extracted directly) and to upgrade heavy oils and bituminous schists will be intensified over the next 5 years.

For his part, the president of the republic told the Central Planning Board: "France will begin a very important oil and gas exploration effort this year within the national territory and offshore. Beginning in 1981, expenditures will be double the 1979 figure and triple the 1978 figure" (totaling 670 million francs in 1980).

The prime minister and the ministers of economy, budget and industry participated in the meeting.

FIVE MEASURES TAKEN TO DEAL WITH OIL CRISIS

Paris SEMAINE DE L'ENERGIE in French 10 Jan 80 pp 2-3

[Text] Without further delay, the government acted on 2 January to determine the effects of price increases approved in Caracas by oil-exporting countries. France's oil bill will amount to 100 billion francs in 1980, compared with 50 billion in 1978, and measures needed to restore balance to the country's economic activity must be taken immediately.

Officials asked for increased austerity in the home, while businesses will be supported in their effort to export and invest more.

The Cabinet therefore approved five series of measures, applicable immediately:

1 -- Effect of oil price increases on refined products

The increase is 19 centimes a liter (for all products). The new prices in the Parisian region are 3.06 francs a liter for gas, 3.27 francs a liter for super, 2.22 francs a liter for diesel fuel and 1.412 francs a liter for home-heating oil. This uniform increase, resulting from an average increase of over $6 a barrel for crude oil, puts French prices on a level with European neighbors.

2 -- Increase in gas and electricity rates

There has been a uniform increase of 6.5 percent in gas rates and an average increase of .6 centime per kilowatt-hour. These measures are intended to compensate for new increases in the GDF's [French Gas Company] gas purchase prices, which depend on the cost of oil products. In a year, the purchase price of imported gas will have increased 65 percent, and for domestic users the average increase will be 11.8 percent.

The new rates of the EDF [French Electric (Power) Company] include, first of all, a uniform 9.1-percent increase, which takes into consideration the evolution in the cost of producing electricity between 1979 and 1980. Furthermore, an average increase of .6 centimes per kilowatt-hour is being

applied to consumption and is intended to compensate for the increased cost of heavy fuel used by the EDF. For domestic use, the total increase will be 10.8 percent.

3 -- Noninflationary financing of the electronuclear program

This program will be continued and even accelerated. In constant francs, needs for loans will remain in the neighborhood of 20 billion francs every year until 1990. Three provisions have been made:

Control of costs: The increase in the wage mass of the EDF must not go up faster, for the same number of employees, than the increase in prices.

Rate policy: Over the next 5 years, the rates of the EDF should progress at the same rate as the price of the GNP. If, in the course of one year, the increase in the price of heavy fuel exceeds 2 percent, in constant francs, the difference will be made up by an additional adjustment in absolute value.

Budgetary aid from the state: Total FDES [Economic and Social Development Fund] loans outstanding (11.7 billion francs) will be turned into a capital endowment. Payment of the remuneration of capital endowments from 1979 to 1981 will be deferred 6 years. Finally, new loans from the FDES will include a 6-year amortization deferment (compared with 3 years at the present time), and their terms (now 15 years) will be lengthened.

4 -- Aid to investment

The government authorizes specialized financial organizations to open up 7.5 billion francs in credits for 1980. The package is set at 3 billion francs for investments for export and 1.5 billion for investments connected with energy conservation.

5 -- Social measures

Some 1.17 billion francs are released for low-income families so as to attenuate the effects of the energy price increase. Likewise, a special allocation will be paid to 365,000 handicapped persons, at an overall cost of 1.5 billion francs.

Finally, the prime minister has asked the ministers of the budget and industry to draw up a report on the taxation of oil companies by March 1980 and to make proposals to the government regarding it.

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CSO: 3102

PROSPECTS FOR AUTOMATED MANUFACTURE IN SMALL, MEDIUM FIRMS

Paris ELECTRONIQUE ACTUALITES in French 10 Dec 79 pp 4, 6

[Article: "Small and Medium-Sized Firms Face Automating of Machines, Robots, and Flexible Shops"]

[Excerpts] The backwardness of small and medium-sized firms in automating themselves is not specifically a French shortcoming, but it appears all the more in our country since it has all the techniques which make it possible to provide solutions to the need for automation of its means of production.

For in the event it is in no way a matter of petroleum refineries, of nuclear generators, of rolling mills, or of automobile production. Those operations, for a thousand reasons, have broad recourse to automation. Automation without which certain processes could not take place, safety and quality could not be guaranteed, and profitability ensured.

The urgent question is found elsewhere. For the large number of small and medium-sized French productive enterprises it is a matter of providing themselves with the technical means of competitiveness, principally thanks to automation. The shops engaged in mechanical production, in this context, are of considerable weight in national production, and are in the first rank of the industries concerned. As, moreover, is the case with all industries which engage in a "discontinuous" process of production by using groups of machines.

Can productivity be increased by better automating what is already automated or what is little automated (or not automated at all), thus ensuring overall management of the shops? How, in short, to reconcile the three present imperatives, which are the increase of productivity, the reduction of delays and of stocks, the flexibility of production in terms of more and more diversified demand? To respond to these questions first requires responding to three basic questions: What is the state of automation of production machines themselves? What can robot techniques bring to production machines? Finally, what about the flexible shop, a utopia for some, a social nightmare for others; can it become the daily reality

which it already is in other countries, such as Japan or Sweden?

There is much that remains to be done in these three areas. And the extent of the effort which must be accomplished cannot be only a matter for the users, the producers of machines (including robots) and the automation specialists. It calls for the establishment of a real policy of sensitiveness and of pressing for automation; an industrial policy also, to put in place without delay the missing pieces on the chessboard of solutions to automation.

Moreover, this policy has just taken shape at the Ministry of Industry, as Mr Lefrancois, deputy director of DIELI [Directorate of Electronic and Information Industries], has explained to ELECTRONIQUE ACTUALITES.

Up to the present, in effect, what is the situation?

The Automation of Machines

The world of machines is so diversified that it is quite difficult to find a definition for them which is not too general or too complicated. But the important aspect is not there. Whether they function in a sequential, analogous, or hybrid manner, whether they set in motion instruments of mechanical, electric, hydraulic, or pneumatic power, whether they are large or small, the fact remains the same: these machines are still very little automated, with the exception of machine tools with numerical controls, which still form, for the moment, a type quite apart. The requirements of productivity, or versatility, of safety of functioning, also of integration in the more widely automated shops would require one to search more often, more systematically, to make them benefit further from the resources of automation.

For the moment, in any case, things are hardly advancing at all. The manufacturers of mechanical machinery hesitate to press automation, fearing to increase the cost of their equipment, fearing not being able to define with sufficient precision the type of automation which would be suitable for the greatest number.

The means of automation of machines remain, therefore, general, and standards (automated, micro-computers) remain external to the machine and optional. Moreover, they are more freely applied by the final user than by the manufacturer of the equipment. The market for automation remains, therefore, essentially oriented towards demand (and not towards offer). Demand which is still quite timid and widely scattered. Often, also, automation is a "house solution" (a group of shops held together by communications).

But if it is true that, for example, the use of a programmable, automated standard for the operation of machines has some advantages (industrial language, possibility of research for the optimal functioning of the machine,

modification of cycles of production, etc.), if it is true, inversely, that a very simple solution, with some changes, can suffice, it is equally true that specialized, automated processes (eventually programmable), conceived of for certain categories or groups of machines, would provide an optimum solution to the problem of their automation. This would be the case as much on the level of functional possibilities as on the economic level. Sometimes, in effect, general, automated processes provide at the same time more than is suitable and less than is suitable, while automated processes operating on land lines are found to be inoperative when the programs or the conditions of use of the equipment change.

Hence, the integration of these new systems of control of machinery could take place under more acceptable economic conditions, and therefore in a more systematic way. Of course, on condition that one has the specific fittings necessary for the automation of the machinery, which is not always the case.

A few examples show, however, that this development is under way: the Crouzet register-checker for diesel motors, or the Multiplastomatic system of Philips for plastic machines, both of them organized around a microprocessor.

The initiative comes in this case from the automation specialists. But can this often be the case? Certainly not. For if the automation specialist, the manufacturer of relays, of automates, of micro-computer cards, of pneumatic components should show himself disposed, on the basis of available evidence, as favoring the application of new systems, few are the cases where he has much impact on the manufacturer of machinery, few are the cases where he has sufficient knowledge of the final market to expand this type of operation.

The resolution of the problem therefore involves a preliminary census of technical needs in terms of machinery and of the corresponding markets. This is required to define, in the first place, the types of machinery relating to the same type of automation and to permit, subsequently, the development of those automated processes while making them sufficiently flexible to respond to particular needs for each type of machine and for each way of using them.

In fact, only the users and, to a lesser degree, the manufacturers of machinery, are in a position to describe these needs, whose implications can only be drawn by a general, professional, or governmental body. This work remains to be done. It is only after this that the automation specialist can return to work and cooperate closely with the mechanic, however little the latter may be convinced of the need to do so.

The problem of the flexible shop and associated ways of operating it more specifically concern machine shops and above all small and medium-sized firms which are required to perform differing series of jobs of average importance, without losing time in adjusting from one job to another. The automation of these shops, so far yet to take place in France, dovetails again and very closely the functions of the manufacturers of machines, of robots, and of the automation specialists.

What does this involve? A shop is flexible if it can adapt itself immediately to a change of production, this change being accomplished, depending on the case, in terms of entire jobs or instantly. This presupposes integral automation of the lines of production, including the automatic loading and unloading of the machines (with the aid of simple tools or robots), the more or less intensified automation of the machines themselves (if, in effect, the order of loading of the machines is required to vary as a function of the manufacturing situation, these machines will necessarily be more intelligent in order to require the robot to implement the corresponding sequences), and finally the automatic, dimensional control of parts for assembly at certain stages of their manufacture, as well as the testing or elimination of parts not meeting predetermined tolerances.

With robots operating in the immediate vicinity of the machines it is necessary to provide for automated means of transport of parts from one point to another in the shop, as well as arrangements--always automatic--for the suitable provision of these parts so that the robots will be in a position to pick them up to feed the machines.

The concept of a flexible shop therefore meets numerous criteria and depends on the industry involved, the nature of the parts, the work to be accomplished, the cycles of the machines, etc. Each problem is therefore a particular problem. In one such case it will be enough, for example, to set out the parts to be handled on a platform or board so that the robot can pick them up.

In another case, given the impossibility of placing the part in a position where it can be picked up by the robot, it will be necessary to make use of bulk-loading and to provide the robot with a system for recognition of shapes and sizes. In one case a single robot will be at the service of a single machine or of a single type of part; in another case it will be at the service of several machines or of different parts. At times the system of supply of parts can be associated with the machine; at times, with the robot.

In the same way the means of dimensional control could be--but not necessarily--an integral part of the machines or, on the contrary, could be external to them. Control could be effected without contact and "on line" or quite separately.

It is therefore important to emphasize that, if the flexible shop can employ extremely sophisticated processes, it can also require very simple processes, available on the market and relatively not very expensive.

Also, the present situation requires precisely accounting for the available or unavailable elements which are likely to enter such shops. This is to permit the development of missing parts and to begin with an experimental effort, whose consequences would be multi-faceted for the concept of the machines, to develop the robots and the general principles of automation of the shops.

For in the immediate future the near totality of machines will not have automated systems of supply and service. The only universal robots capable of being associated with machines are of foreign origin (ASEA, Unimate), as are the simplest, automatic systems for the loading of machines. Therefore, the limited availability of the means of handling materials offered by manufacturers leaves one to think that, at least for the near future, it will be up to the robot specialists to assume the task of developing them. The principal French manufacturers of robots, attached to specialized industrial groups (Renault for ACMA-Cribier), to whom they earmark a large part of their production, are not necessarily inclined to move out of the specialties in which they have gained their reputation (robots for painting, soldering, casting metal, etc.). Let us add, in parentheses, that many new applications for robots are evident today in the field of assembly of parts of small dimensions (electric home appliances, electro-mechanical apparatus), for which French industrial products are also unavailable.

However, let us avoid reaching hasty conclusions: the use of robots, as it has evolved, is not a solely foreign specialty. So much remains to be done. Highly sophisticated systems are experimented on in public and private laboratories, which astonish Japanese specialists. But concrete applications do not yet exist or rather are concentrated on the heaviest of industrial tasks. In France public activity in favor of the use of robots has depended rather on the financial support of scattered projects, than on a true Research and Development policy, on a plan involving precise objectives and stages for its application. Contrary to the situation in countries like Japan, in France research is defended as being at the daily service of industry. In the same way the financial means from which the development of robots has benefited, up to now have not been sufficient. Finally, the development of robots has been treated as an entity in itself, dissociated from its industrial environment, whereas it is closely linked with its applications--notably in the framework of the flexible shops. Only a preliminary analysis of the whole subject can permit the development of priorities and the coherent search for the solutions which the priorities indicate.

5170
CSO: 3102

GENETIC RESEARCHER PROPOSES NEW SPLICING MODEL

Paris LE MONDE in French 30 Jan 80 p 16

[Article by Xavier Weeger: "A CNRS [National Center for Scientific Research] Researcher Suggests a Model Which Explains the 'Loss' of Part of the Genetic Message"]

[Text] The machinery of any living cell operates on the basis of similar principles. In particular, we know that the making of proteins depends on the genetic code which is contained in DNA molecules. For several years, however, it has been confirmed that in the superior cells (eucaryotic) the reading of the genetic code is different from the one in inferior cells (procaryotic): specifically, it has been confirmed that in eucaryotic cells the message contained in some of the DNA molecules (located in the chromosomes within the nucleus of the cells) is not entirely used in the course of protein synthesis.

In a note presented on 28 January, Monday, to the Academy of Sciences, by Prof Francois Jacob, Nobel Prize, Mr Piotr Slonimski, a researcher at the Center of Molecular Genetics of the National Center for Scientific Research in Gif-sur-Yvette, has presented a model which could explain the way the eucaryotic cell chooses the parts of the DNA which are truly useful for protein synthesis and eliminates those which do not seem indispensable to such synthesis. Naturally, the model is still a working hypothesis. However, it is based on a certain number of experimental facts which make it quite plausible.

No more than a few years ago biology researchers believed to be sufficiently familiar with the principles according to which proteins were synthesized within the cells: the message corresponding to the structure of the protein is contained in the "double helix" of the DNA. Under the influence of some enzymes this message is duplicated to give birth to RNA molecules. In eucaryotic cells this RNA, known as a messenger RNA, leaves the cell nucleus and enters the body of the cell (the cytoplasm), where it is taken over by specific structures; these structures, ribosomes, are then capable of decoding the message contained in the messenger RNA to build proteins using the amino acids found in the cytoplasm, in accordance with an order

specified in the message. The elucidation of the role which the messenger RNA plays was worth the 1965 Nobel Prize to Professors Francois Jacob, Jacques Monod and Andre Lwoff.

Recently, however, it was noted that, at least as far as eucaryotic cells were concerned (the model still appears applicable to procaryotic cells), a phenomenon which had remained unnoticed until then was intervening between the making of the RNA duplicate and its decoding by the ribosome. Progress in the field of genetic techniques has enable researchers to read, word for word, the genetic code used by the DNA and the RNA. It appeared that in a number of cases bits of entire sentences vanish between the point of departure of the DNA and the point of arrival of the messenger RNA, which will be used, in the final account, in synthesizing the protein.

Today it is generally accepted that the very first stage of the RNA synthesis properly follows the developments as determined so far: starting from a clearly determined DNA area, an enzyme described as RNA polymerase, reads, word for word, the message contained in part of the DNA and makes an RNA molecule which is now described as a premessenger RNA. However, before leaving the nucleus and telling a ribosome how to synthesize the corresponding protein, this premessenger RNA undergoes a transformation: in order to become a messenger RNA which could act within the cytoplasm, the premessenger RNA must lose unnecessary bits known as "introns." This operation known as splicing, therefore, consists of removing unnecessary introns from the final protein synthesis and reassembling the bits known as "exons" to make the messenger RNA.

A number of teams, including that of Prof Pierre Chambon (Strasbourg) which was recently awarded the gold medal of the CNRS, have proved that in most cases the presence of certain series of letters in the genetic code seems to characterize the lines dividing neighboring exons and introns. This could explain how the introns are recognized before being excised.

The splicing process remains to be determined. That is precisely what the model suggested by Mr Slonimski suggests; a feature of the model is that it suggests a combined explanation of the problem of the choice of the parts of the premessenger RNA to be kept and the moving of the RNA chain through the nuclear membrane, from inside the nucleus to the cytoplasm.

Special Proteins

To explain the two phenomena (selection and transfer), Mr Slonimski postulates the existence of a type of special protein, the m-proteins (messenger proteins). To begin with, they would have the feature of using a specific word of the genetic code in a way different from that of the normal proteins: the word would be normally understood within the protein synthesis as an "end of message." At this point, like most words in the genetic code, it would trigger, in the course of the synthesis, the addition of an amino acid (the tryptophan in this case). Above all, unlike what seems

to take place in general cases, the synthesis of such m-proteins would use part of the message contained in one of the introns of the DNA sequence.

The Gif-sur-Yvette researcher has, as a matter of fact, determined that in the case of certain number of known sequences, and in accordance with the hypotheses which we have described, using the message contained in the first exon and the beginning of the adjacent intron, up to an "end of message" signal, it is possible to build proteins with interesting properties: the thus constructed molecular chains--such synthesis taking place within the nucleus--seemed, in effect, to be able to be fixed, through one of their ends, to the membrane of the cell nucleus. The other end would be able to recognize the premessenger RNA molecules manufactured within the nucleus and capture them. Such m-proteins could be the beginning of the splicing phenomena, and, being tied to the membrane of the nucleus, insure the transfer of the RNA through the latter. A different m-protein would correspond to each gene (each message), and each m-protein molecule would be able to secure the splicing and transfer outside the nucleus of a large number of molecules of that same messenger RNA, which would thus find themselves within the cytoplasm, making the synthesis of normal proteins possible.

Mr Slonimski points out that such m-proteins could be the decisive elements of genetic control within eucaryotic cells. Given their very limited number, they would yield with difficulty to direct experimentation.

5157
CSO: 3102

MINISTER DISCUSSES LONG-RANGE RESEARCH PLANS

Rome IL TEMPO in Italian 14 Dec 79 p 15

[Article by G. D'Av.: "Scalia Points Out the Exigencies of Scientific Research]

[Text] In a speech to the Senate Public Instruction Committee, the minister for scientific and technological research coordination, honorable Vito Scalia, recognized that "the fundamental lack of our country's research apparatus is not to be found at the individual researcher or institutional level, but rather in the essential weakness found in the dearth of extensive managerial capabilities and in the lack of a communicating network and suitable mechanisms needed to input research and its results in the developmental model of Italian society."

Focusing on the inadequacy of the national budget allocation for research, (2,400 billion lire in 1979, of which half from the public sector, an allocation larger in Europe than Denmark's and Ireland's alone), on the brain drain, on the dissatisfaction of youth and other negative aspects, the minister announced a series of proposals to correct the deficiencies mentioned above. These proposals include instituting a General Fund for Research (for the reorganization of that sector) and a rearrangement of the institutional framework called for by Law Number 283 dated 2 February 1963. "A first step in this direction" said Scalia, "has been taken with the delegation to authorize direction and vigilance over the CNR [National Research Council].

Touching on the theme long-term research policy, the minister explained that the latter cannot help but be based on criteria of "absolute freedom and adequate support." The main pillars of a long term research policy among others, include a renewal of the fund for applied research, a reproposal in the chamber for a draft bill on "the public contract on research," creation of new study centers in the South and the formulation of a national plan for energy research. The minister furthermore pointed out the commitment to "the development of sectors such as those of agriculture, electronics, the environment, health and information. Of note, is the fact that the subject of energy research was tackled: (whose plan, stated Scalia "is to be implemented following the deliberation by the Council of Ministers."

Up until now the plan was shunned by public agencies because of an interpretation, open to question, on part of the CNR which tasked the planning to ENEL [National Electric Power Agency] and CNEN [National Nuclear Energy Commission].

The minister did not speak about the hotly debated issue of who will administer the national space plan (Italian NASA), but did mention that a second space plan (1981-1985) is being readied and will be submitted to CIPE [Interministerial Committee for Economic Planning] by the end of next year. In his concluding remarks, Scalia expressed the opinion that the difficulties can be overcome "by having the political will to succeed and as much as possible to have the Minister of Research exercise his powers getting the development of the sector under way."

9209
CSO: 3102

MINI NUCLEAR PLANTS PROPOSED TO HEAT GREATER STOCKHOLM

Stockholm DAGENS NYHETER in Swedish 30 Jan 80 p 5

[Article by Mert Kubu]

[Text] Heat Greater Stockholm with hot water from Forsmark. Otherwise we should consider a system of mini reactors of the Secure type linked to the district heating network. These demands were made by the campaign leader for Line 1 in Stockholm--the Conservative Industrial Commission member, Carl Cederschiold--at a hearing in Industrial House on Tuesday.

He had the support of chief physician Nils Erik Landell, the environmental giant and the man who switched sides, as well as the head of the Stockholm Energy Board, Jan-Erik Ryman.

"How many reactors do you really want in Line 1?" a member of the public asked suspiciously. "Didn't you say 12 at the most?"

But Landell explained that he preferred the Secure mini reactor rather than one of the larger models. Mini reactors are safer, have fewer moving parts and are more in line with the conservation laws.

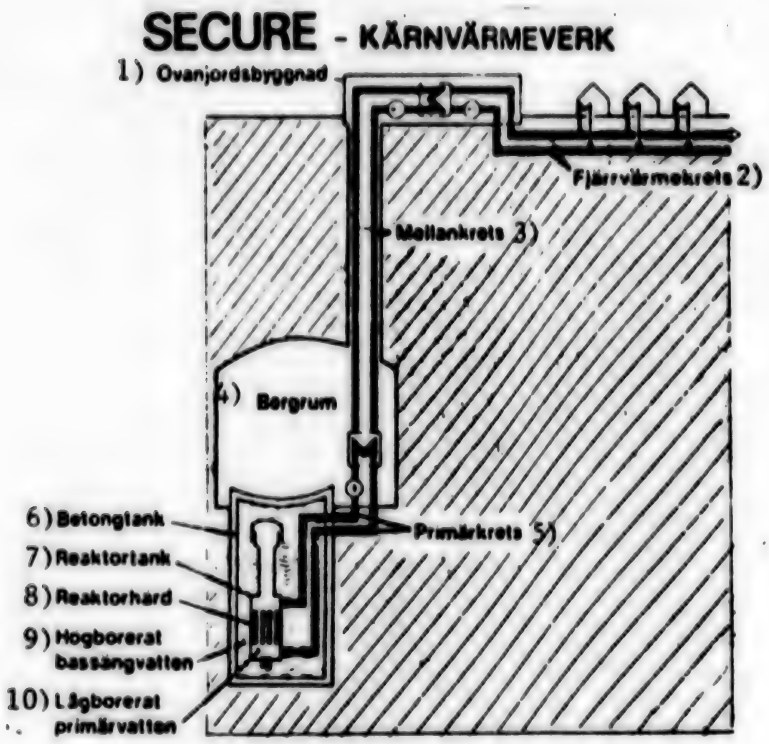
The Secure is cheapest and technically superior in Ryman's opinion. But there is no political support for these mini reactors at present. Therefore Ryman recommended piping in hot water from Forsmark.

Dependent on Oil

Today Stockholm is more than 85 percent dependent on oil. As we have reported in detail in DAGENS NYHETER the capital's district heating network stands or falls on the basis of oil.

The heating plant in Vartan was to be fueled with natural gas. That possibility exists--but we don't have any natural gas.

A plant in Hogdalen can be fueled with trash. Part of the Hasselby plant is fueled with coal. But that is a drop in the bucket.



Secure Nuclear Heating Plant

Key:

1. Above-ground buildings
2. District heating network
3. Intermediate circuit
4. Underground cavern
5. Primary circuit
6. Cement tank
7. Reactor tank
8. Reactor core
9. High-boron pool water
10. Low-boron primary water

If Stockhom cannot be heated with waste water from the Forsmark reactors we should build mini reactors like the Secure model, in the opinion of Stockholm's new Industrial Commission member, Carl Cederschiold (Conservative), Line 1 campaign leader. ASEA-Atom [Swedish General Electric Corporation] launched the Secure, a mini reactor of approximately 200 megawatts. Big reactors produce close to 1000 megawatts. Since these reactors are used solely for heating water they can be built much safer. Temperatures and pressures are both lower. Some participants in the debate are now claiming that some of the 12 reactors proposed could be traded for a number of mini reactors. No Secure reactors have been put into operation yet.

What happens when oil becomes scarce or too expensive to burn? There are the following alternatives:

1. Build a hot-water pipeline from Forsmark. This would need a yes vote on the use of 12 reactors. Such a pipeline would cost about 4 billion kronor. Close to another billion would also be needed for rebuilding the Forsmark reactors so the waste water can be tapped.

Profitable Pipeline

But in return we could save 1.5 million tons of oil a year in the Stockholm region. That would save close to 2 billion kronor per year. Thus a pipeline would quickly pay for itself. The earliest date it could be put into operation would be 1987-90.

2. Put in a network of big coal-fired heating plants in Greater Stockholm. If this were decided today and no discussion proved necessary such plants could go into operation by 1985 at the earliest. It is more realistic to count on 1987 or later.

3. Decide on mini reactors for district heating. Construction time 3-5 years, perhaps longer. But there are no plants of this kind in operation. And there is no political majority behind them. This might be a possibility in a future crisis.

4. Bank on natural gas. But where can we get it from? And when? For how long?

5. Continue to heat with oil. But for how long? At what price?

"If there is a war risk all the reactors have to be shut down. In that case how would you heat Stockholm if you go in for hot water from Forsmark?" someone from the armed forces wondered.

"We would have the old heating plants that could be operated with oil or coal from emergency reserves. That system still exists," Ryman replied.

6578
CSO: 3102

WAVE POWER STUDIED; ADVANTAGES, DISADVANTAGES DISCUSSED

Stockholm SVENSKA DAGBLADET in Swedish 21 Jan 80 p 5

[Article by Margareta Artsman]

[Text] Goteborg--Imagine a wave power plant with several thousand buoys in a chain off the Bohus coast or southeast of Gotland. Each buoy runs a generator that produces electrical energy as a result of the movement of the waves.

This will be a reality in the 1990's. Such a power plant should be profitable too.

That is the opinion of a group of scientists at Chalmers who call themselves the "wave energy group."

In 10 years we will have a prorotype of several megawatts at sea, they said.

This summer for the third year in a row tests of a "mini-power plant" in Lake Lygnern will continue.

Small-scale measurements on the buoys will be made. The lake, a few miles south of Goteborg, is well-suited for these experiments. It is 20 km long, 2-3 km wide and is located in the right wind direction. Waves there reach a height of 1.5 meters.

"Wave energy must be evaluated in the same way as wind power," said the Chalmers researchers. The supply of energy in the ocean is enormous. The costs of a wave power plant do not rise with inflation after the plant has been constructed.

Tests for 2 Years

The group stated that wave energy is fully comparable with other sources of alternative energy.

"If we estimate a real interest of 4 percent the cost would be 14-35 ore per kwh while 10 percent interest would give a cost of 25-50 ore," said civil engineer Lennart Claeson, consultant for the group.

But it has not yet been decided whether Sweden will invest in wave energy in the future. Research over the next 2 years will provide the background for making a decision. The state has appropriated funds through 1981.

There is a lot of wave energy available off the coast of Sweden. The estimate is 4-15 kilowatts per meter of wave. Off Norway the average effect is 20 kw per meter and the figure is double in the vicinity of the Hebrides.

SMHI [expansion unknown] has taken measurements for 2 years and has also calculated wind speeds. A system that correlates waves with weather conditions makes it possible to use stored data on wind conditions going back several years. This makes a statistical calculation of how high waves will be at various locations possible.

"Smogen--and the rest of the Bohus coast--as well as the southeast coast of Gotland are of interest from the point of view of wave energy," said Lennart Claeson. "It is likely that a full-scale buoy will be tested first on the west coast. But it is very possible that Gotland will get the first wave power plant of several megawatts."

Chalmers has decided to use a buoy power plant but this does not mean they are definitely committed to this type.

"There are not many different kinds of wave power plant and if we find a foreign project that would work better for us within the next few years of course we would look into it."

The wave power plant the group is working on transforms energy directly into electrical energy in linear generators.

Via Cable to Land

The buoy consists of a slowly moving disk bearing a pole on which the buoy works. The relative movement between the buoy and the disk is utilized as a source of energy. The buoys are linked together electrically in series--in order to even out the effect from each buoy. Electrical energy is brought ashore via a cable on the ocean floor.

There are interesting systems in other countries. So far Japan and Great Britain have gone the farthest.

Japan already has a 1-megawatt wave power plant in operation. It is a ship whose hull is divided into sections, some of which are bottomless.

in these the water rises and falls in rhythm with the waves, pressing out or sucking in the air above through a turbine.

In England they are working on several different energy transformers, for example air turbines. In Finland a group is working on a computer-operated power plant with wedge-shaped objects in the water.

Norway also has several projects going in addition to wave buoys, among them a system of focusing waves in the same way as light is focused with the help of a convex lens. The giant wave goes to a storage area high above the surface of the ocean and the water is then conveyed to a conventional power plant.

Building a buoy power plant will probably be expensive. This depends on how hard it is to anchor the system, among other things. But the operating and maintenance costs are expected to be low. Several thousand buoys--at the very least--are needed for a medium-sized power plant of around 25 megawatts.

The wave energy group estimates that by the mid-1990's Sweden could get 15 Twh from wind, sun and wave energy--with wave power supplying 5 Twh. (Sweden now produces 90-95 Twh annually.)

Clean Energy Source

"To produce that much wave energy the buoys would have to occupy a stretch of the coast 15-25 miles long," Lennart Claeson said.

The Chalmers researchers are very enthusiastic about wave power. They point to the many advantages.

It is a clean source of energy without any directly harmful effects on the environment.

The availability of wave power is also greatest when demand peaks, in other words during the winter. The ice on the west coast does not have to be a problem. The buoys can be equipped with ballast and sunk beneath the surface when the water freezes.

The buoy system is simple and sturdy. Wave energy is transformed directly into electrical energy in the buoys.

The buoys can ride out storms. They also tend to calm the waves and this effect could be used for fish and mussel breeding purposes.

The buoys could be mass-produced on a large scale, with each buoy requiring very little capital investment. And individual transformers are not dependent on the direction of the waves. Energy production can be

regulated and the work of the buoys can be adjusted to shifting wave conditions.

Another good point is that through testing a single buoy one can get a relatively comprehensive picture of how a future power plant would function.

In addition this type of buoy power plant could be an excellent export item for Sweden.

Power Varies

The biggest disadvantage is that wave power--like wind power--varies from time to time. At times the waves are high for a few hours and then subside. Thus storage will be a problem. A flexible reception network is necessary and wave energy must be supplemented with other types of energy.

6578
CSO: 3102

PLAN TO USE PELLETIZED REFUSE AS FUEL FOR POWER PLANTS

Stockholm DAGENS NYHETER in Swedish 29 Jan 80 p 7

[Text] A fifth of Sweden's refuse could be used as a source of energy. That could save around 500,000 tons of oil a year. Helsingborg's Atervinnings Company will now build with state assistance a plant where refuse is pressed into small pieces, called pellets, that can then be burned in heating plants, for example.

The plant will process 9000 tons of pellets a year. That corresponds to around 4000 cubic meters of heating oil. The project is the first of its kind in this country. For this reason the Industrial Agency feels the government should chip in 4 million kronor.

The pellets that will be processed have the same heating value as pit coal and are cheaper to transport and easier to fire with. They will mainly be used in big industrial areas which have furnaces that can use solid fuel.

About 6.5 million tons of refuse is thrown out every year. Local communities are responsible for handling trash but only a tenth of it is used for burning. There are 25 incinerators for this purpose.

The idea is that as much should be reclaimed from this trash as possible, for example paper, metals and plastic. Some of the rest can be used as fuel but first it must be pelletized and that is what Helsingborg's Atervinnings Company should receive state aid for starting up in the view of the Industrial Agency.

6578
CSO: 3102

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